

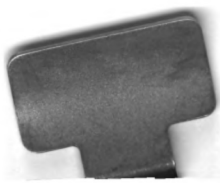
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Science, Technology, and the Future of the U.S.-Japan Relationship



National Research Council



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Science, Technology, and the Future of the U.S.-Japan Relationship

Issues Paper
Prepared by the
Committee on Japan

Office of Japan Affairs
Office of International Affairs
National Research Council

NATIONAL ACADEMY PRESS
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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competencies and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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2101 Constitution Avenue, Washington, D.C. 20418

December 29, 1989

Dr. Harold Brown
Chairman
Committee on Japan
National Research Council

Dear Dr. Brown:

As you know, the National Academies of Sciences and Engineering have undertaken a number of initiatives to stimulate thinking about how U.S.-Japan relations, particularly in science and technology, can be developed in the years ahead to ensure that both countries benefit. Two high-level bilateral meetings were convened, the Office of Japan Affairs was established, and the Committee on Japan was organized to provide programmatic guidance and to address the policy issues surrounding a rapidly changing US-Japan relationship in science and technology.

Recently, we have had the opportunity to review the issues paper prepared by your committee entitled "Science, Technology and the Future of US-Japan Relations." The paper crystallizes the views of the members of the Committee on Japan, who are uniquely qualified to examine the linkages between science and technology and the broader context of trade, security and diplomacy. By outlining a new context for US-Japan relations, and identifying the challenges that must be faced if both countries are to remain on the frontlines of science and technology, the Committee on Japan has laid a foundation for further debate and discussion by policymakers, business and academic leaders in both countries. In view of the importance we attach to the views expressed, we recommend that the Committee on Japan make the paper available to a wide audience.

Frank Press



President
National Academy
of Sciences

Robert White



President
National Academy
of Engineering

COMMITTEE ON JAPAN

The Committee on Japan has been established to advise the Office of Japan Affairs on its programs, and to assist in defining the contribution that the Academies can make in enhancing U.S. interests through science and technology exchange with Japan.

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*Unable to participate in the preparation of the paper due to circumstances beyond his control.

OFFICE OF JAPAN AFFAIRS

Since 1985, the National Academy of Sciences and the National Academy of Engineering have engaged in a series of high-level discussions on advanced technology and the international environment with a counterpart group of Japanese scientists, engineers, and industrialists. One outcome of these discussions was a deepened understanding of the importance of promoting a more balanced two-way flow of people and information between the research and development systems in the two countries. Another result was a broader recognition of the need to address the science and technology policy issues increasingly central to a changing U.S.-Japan relationship. In 1987, the National Research Council, the operating arm of both the National Academy of Sciences and the National Academy of Engineering, authorized first-year funding for a new Office of Japan Affairs (OJA). This newest program element of the Office of International Affairs was formally established in the spring of 1988.

The primary objectives of OJA are to provide a resource to the Academy complex and the broader U.S. science and engineering communities for information on Japanese science and technology; to promote better working relationships between the technical communities in the two countries by developing a process of deepened dialog on issues of mutual concern; and to address policy issues surrounding a changing U.S.-Japan science and technology relationship.

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The text of this issues paper is available in Japanese upon request to the Office of Japan Affairs.

Science, Technology, and the Future of the U.S.-Japan Relationship

The U.S.-Japan relationship in science and technology is undergoing significant changes which present dilemmas for policymakers, business people, and researchers in both countries. The global context is changing, particularly in the dynamic economies of East Asia and in Europe. At the core of the significant changes, however, is Japan's emergence as a technological superpower. From the perspective of the United States, a major challenge is to develop mechanisms for acquiring technological know-how from Japan and to bring that knowledge to bear in increasing the competitiveness of manufacturing and service industries. Japan, on the other hand, faces challenges in developing basic research capabilities and mechanisms for transferring technology to the rest of the world. Developing effective responses to these challenges should be a top national priority.

BACKGROUND

For more than a decade, U.S. leaders have been calling for a "new partnership" with Japan. Initially, these calls came from Congressional representatives concerned to open up the Japanese market. More recently, interest in forging a new relationship has carried over into discussions of development assistance, science and

technology, and the global environment. Japan's weight in finance, trade, and technology is the backdrop for efforts to redefine a bilateral relationship that will be viable in the next century. The new reality is that even though Japan's economy and technology will not equal that of the United States in every respect, it will surpass it in some areas. The United States must, therefore, deal with Japan as an economic and technological superpower.

At a general level, there appears to be agreement in the United States on the need for a new type of relationship with Japan, but uncertainties cloud the debate. We want Japan to "do more" to support the bilateral relationship and the Western alliance more generally. But how and where should Japan do so? Some call on Japan to share more of the defense burden while others note that a rapid military buildup would appear threatening to other Asian countries and could usher in a more independent Japanese foreign policy. Japan has significantly increased its development assistance budget, but observers worry that this will turn once again to Japan's economic advantage just as U.S. aid recedes from the scene in many countries of the developing world. We call on Japan to contribute its high technology to U.S. firms but worry that America's industry and military have become too dependent on components from Japan. In short, we are only beginning to take account of the new influence that will accompany growing Japanese power.

Another uncertainty concerns the prospects for Japanese leadership on the international stage. Japan's political, business, and bureaucratic leaders increasingly discuss internationalization, their aspirations to make global contributions in science and technology, and their intention to develop a more active diplomacy. There are signs of change, such as former Prime Minister Noboru Takeshita's attempts to speak for Asia at the 1988 Toronto summit and Japanese proposals to deal with the third world debt crisis. But many believe that a low key approach that supports Japan's economic self-interest will remain the dominant theme in Japan's foreign policy. An insular mentality must be overcome if Japan is to step out into global leadership, but it is unclear that Japan's political structure will permit such a change.

The future of U.S. leadership is also uncertain. The U.S. agenda

is crowded with pending issues such as the twin trade and budget deficits. The resolution of these issues, or lack thereof, will affect U.S. capacity to lead. A national debate is now under way over whether the United States is in a period of "decline" or "renewal." In this context, Japan figures prominently in evaluations of the extent to which causes and solutions depend on domestic or foreign factors. The lessening of East-West tensions may reduce the salience of military security in the U.S.-Japan relationship and heighten attention to economic and technological issues.

While some may doubt the ability of Japan to sustain its record of economic performance, Japanese business is actively responding to trade frictions and a higher valued yen by moving production offshore, both to the United States and to the newly industrializing countries. During the past few years, Japan's direct investment in U.S. manufacturing has grown rapidly and Japanese firms are beginning to set up research and development (R&D) facilities here. Americans view these trends with mixed emotions: we welcome the jobs and the inflows of capital and technology, but worry about the implications of foreign control.

SCIENCE, TECHNOLOGY, AND THE FUTURE OF THE U.S.-JAPAN RELATIONSHIP

Science and technology moved to center stage in U.S.-Japan relations in the 1980s. Growing attention to the contribution that U.S. science and technology have made to Japan's postwar economic success has provoked an examination of the conditions under which science and technology exchanges occurred in the past. It is true that the predominant pattern during the postwar period has been one of technology transfer from the United States to Japan and that Japan sends many more researchers to work in U.S. laboratories than vice versa. At the same time, to focus only on Japan's use of foreign-sourced technology obscures the reality that Japanese industrial excellence in low-cost, quality production and in consumer-oriented marketing has set new standards for international competition in manufacturing industries. Whatever the past, there is a new determination to ensure "fair" exchanges in the future.

Economists recognize that science and technology are major factors contributing to economic growth. More importantly, Japanese policy leadership *believes* that science and technology are the well-spring of economic growth, and that science and technology hold the keys to Japanese global leadership in the twenty-first century. In the United States the recognition is growing that success in innovation, competitiveness, defense, and diplomacy all increasingly depend on scientific and technological performance, even though there is as yet no consensus on policy prescriptions.

As a result, technology, economics, and politics have become intertwined. Growing links between U.S. and Japanese corporations, universities, and government research laboratories create a more complex policy agenda as the lines between science, technology, trade, defense, and investment policy have blurred. U.S. government agencies such as the Department of Commerce and the Office of the U.S. Trade Representative were involved in protracted negotiations over the renewal of the U.S.-Japan Science and Technology Agreement and in 1988 demanded a voice in the FSX decision. Once a quiet domain of technical experts, science and technology policies are now the terrain of interagency turf battles and the subjects of best-sellers in both the United States and Japan.

Shifts over time in the relative economic and technological weight of the United States and Japan lead us to questions about "sharing" and "openness." Japan, a country that perfected the ability to learn from abroad (and from the United States in particular) in science and technology, has now become one of the world's important sources of technological advances. Japanese industry is the driving force in Japanese R&D, but corporate programs are largely proprietary and therefore not easily accessible to outsiders. The United States maintains a research system that is the world's most open and second to none in basic research. Some therefore conclude that the United States is trapped in an unfortunate division of labor: while the United States continues to generate new ideas and technologies, Japan gains the commercial advantage.

The question that must be addressed is what kind of U.S.-Japan relationship we want—what can we achieve and what are the options—in the twenty-first century. An appraisal of U.S. strengths

and weaknesses is a critical element in the question of what kind of future relationship we want with Japan.

Some believe that the United States is in decline. The appearance of deficits in some high technology product trade categories in the 1980s has been a cause for concern. While foreign-born researchers who stay in the United States make important contributions, lack of interest in science and engineering careers among American-born students is also recognized as a significant problem. So too are constraints (both financial and structural) on federal resources to support industrially oriented R&D. The U.S. lags in discipline, focus, and unity of national efforts. Technology policy is a given in Japan, but a subject of debate in the United States. Many see this as a zero-sum game with Japan that the United States is losing.

On the other hand, there is a contrasting perspective that the United States will remain the most powerful country in the world by virtue of its fundamental economic and military strength. Optimists argue that there is no proof of *absolute* U.S. decline. U.S. firms are at the forefront of an information technology revolution and their global operations are a plus for the U.S. economy. Some see positive signs in the fact that U.S. manufacturing productivity grew faster than average of the seven summit nations since 1982, although U.S. growth in manufacturing productivity has been slower than Japan's since 1972. The United States still has the largest market, the military establishment of a superpower, significant natural resources, and a strong research establishment.

U.S. strengths and weaknesses vis-à-vis Japan must be taken into account. Expectations and goals for the future of U.S.-Japan relations depend on assumptions concerning the capabilities of the two countries in the next century. While it is clear that science and technology are important to national prestige and power, there is no easy way to evaluate their contributions. The relationship between basic research, technology development, and commercialization is complex and a simple linear model is clearly inadequate.

The United States still leads in pioneering and generic advances in science and technology, and in introducing first products based on such research "breakthroughs." Japan has developed strengths

in the application of evolutionary science and technology to successive generations of products. Japan is also strong in manufacturing and marketing cost-effective products, although the United States maintains leadership in designing and integrating sophisticated products and systems with elegant features and functions. In contrast to Japanese skills in spotting and acquiring scientific and technological knowledge from abroad, the United States lags in this area and in nurturing technical personnel who can operate effectively in foreign research environments.

It is important to remember that science and technology embody different types of knowledge. Scientific knowledge is freely communicated across national borders in a common language. National capabilities cannot, however, be measured solely in terms of scientific breakthroughs. Technological knowledge is tied much more closely to a particular manufacturing effort, as carried out by specific individuals and organizations. What the Japanese experience shows is that talented researchers, working together with manufacturing engineers and marketing experts, are essential if a firm is to capitalize on innovations. Viewed from a long-term perspective, differential success in the marketplace relates to the educational, market, research, financial, industrial, and governmental systems of countries—differences that make it difficult to mobilize resources needed to improve efficiencies of production, finance, technology development, and diffusion.

Considerable attention has been given in recent years to the question of “who has the lead” in particular fields of science and technology. Many of these analyses show growing Japanese strength. The Ministry of International Trade and Industry’s (MITI) report on industrial technology published in late 1988, for example, shows that Japanese industry leaders believe that Japan has made significant progress in “catching up” in the past five years. They see Japan as now “ahead” in nine out of forty high technology product categories. They also judged Japan to be ahead in technological *development* potential in a number of fields (assembly robots, micro-processors, computer-aided design and manufacturing, laser printers) where Japan’s technological level is equivalent to that of the United States. In other words, they believe that Japan and the United States

are on a par in terms of technological capabilities in many high technology research and product areas. While the selected technologies do not necessarily represent a comprehensive view of all the technologies important to an economy, it is striking that respondents see Japan as clearly behind in only four high technology product areas (databases, jet engine, magnetic resonance imaging, and satellite launching technology). Most studies by U.S. experts share the conclusion that Japan's high technology capabilities are now on par with or ahead of the United States in many fields. The picture is, however, more complex. Overall weaknesses in the basic research system of Japan, particularly its university research, must be carefully considered. The United States remains at the cutting edge of *scientific* advance in most fields, and the excellence and openness of the U.S. university research system acts as a magnet that draws the best talent from around the world. The United States, moreover, retains the edge in technology development as well as market share in industries such as aerospace. In artificial intelligence, biotechnology, and systems integration, most experts see the United States as ahead of Japan. American producers of chemicals, pharmaceuticals, refrigerators and some other consumer products, it should be noted, remain competitive on a cost and quality basis.

From the perspective of comparative advantage, it seems unlikely that either Japan or the United States will attain dominance across the board in all fields of science and technology. Nevertheless, Japan has developed an unusually effective approach to technology policy, one based on constant exchange between government and industry and among the firms themselves. In contrast to the situation in the United States where debate continues over the proper role of the government in industrial and technology policy, Japanese government agencies work to *create* comparative advantages in many fields—not only by identifying certain industries as strategic but more and more by encouraging R&D in fundamental technologies expected to be the drivers of the next generation of products. The Japanese experience illustrates how skills in technology acquisition, adaptation, and diffusion have contributed to building a powerful base for market leadership, despite weaknesses in scientific research.

The important conclusion to be drawn is that Japan has become

an economic and technological superpower. Japan's ascendance to leadership was facilitated by technology-conscious industrial policies and business leadership in the 1950s and 1960s. The result was to restrict foreign direct investment, to enhance Japanese bargaining power for technology imports, and to make it possible for Japan to make these technologies indigenous. Additional policies fostering industrial concentration during the 1960s when formal controls were liberalized were also important. The capabilities that Japan has built will likely serve as the foundation for future strengths in related fields of research and in trade in industry and services. Because of these accumulated strengths in economic and technological realms, Japan has increased bargaining power to negotiate the future terms of exchange.

Will a more powerful Japan be more independent of or interdependent with the United States? From a national policy perspective, Japan's foreign policy has been largely derivative of that of the United States in the postwar period. Looking back, Japan's pursuit of "economic security" only infrequently ran directly at cross-purposes with U.S. policies, for example, during the oil crisis of the early 1970s and in trade with South Africa. The most significant political "shocks" to the bilateral relationship have occurred at U.S. initiative—in China, for example, in the early 1970s. Frictions in the trade policy area contrast with the unusually close overlap of interests in other foreign and security policy spheres.

Americans see Japan as an emerging "superpower" whose commercial success was built on a mercantilistic approach that is no longer viable. But Japan may be a superpower of another sort. There is good reason to question whether the political consensus exists in Japan to support the kind of military buildup or assertiveness in foreign policy that would be required for true superpower status. On the other hand, Japan is gaining ground in dual-use technologies used in modern military systems. Japan is also piling up financial wealth that constitutes a major new resource. Those capabilities, coupled with a national focus on science and technology, make it likely that Japan will be a formidable global "player" in the years ahead even if Japan does not strive for superpower status as traditionally defined.

The problems of trade policy reflect significant structural differences in the two economies as well as signs of growing interdependence. The U.S. defense establishment has come to depend on Japanese-supplied components, and the U.S. military is interested in obtaining Japanese technology developed in civilian as well as military R&D programs. Hundreds of U.S. and Japanese firms, many of them direct competitors, are nevertheless teaming up in joint ventures and strategic alliances of various sorts. Motorola, for example, has structured alliances with Japanese competitors to jointly develop integrated circuits. Japanese support for U.S. research is growing, and U.S. companies are setting up R&D facilities in Japan. Despite the growing linkages in science and technology between the two countries, a persisting U.S. trade deficit with Japan and a loss of market share to Japan in some third country markets are serious problems because as a result, over the long run, American standards of living and economic well-being may be jeopardized.

Despite the deepening of interdependence, its future is far from certain. Depending on the assumptions one makes, quite different types of "futures" can be imagined. If either the United States or Japan were to gain an overwhelming "lead" across the board in science and technology, the nature of the relationship could change significantly. At the same time, the future bilateral relationship will also depend on the national policy perspectives. How we react will depend on what we fear the other might do down the road. There is mounting evidence that Japanese leaders fear a cutoff from foreign technology, a concern that has stimulated a renewed Japanese emphasis on indigenous technology development. From a U.S. perspective, fear of Japanese control of U.S. markets and financial and research institutions may lead to restrictive responses. The stakes are high because, as noted earlier, technological and economic capabilities will significantly affect national security broadly defined.

COPING WITH JAPAN AS TECHNOLOGICAL SUPERPOWER

If we make the assumption that the United States and Japan will have similar capabilities in many fields of science and technology, that neither country will be clearly ahead or behind across the board,

what kind of future relationship is likely to evolve? On the one hand, the result seems to be to push the two countries toward greater interdependence. Each country must tap into the expertise of the other. In the future, neither country will have the resources (human, financial, or otherwise) to support large research projects in all fields. In theory, at least, both sides can gain by pooling resources to support costly projects. In theory, at least, market competition can stimulate new investments in R&D. In theory, at least, the two countries can also cooperate in providing technical assistance to developing countries and in addressing global problems.

The situation is not static, and there are real dangers if new policy approaches are not developed to deal with Japan as a technological superpower. The result could be new frictions and restrictions on science and technology exchange. If the large U.S. bilateral trade deficit with Japan continues, resentment toward Japan will grow. Under those circumstances, the view from Japan could go beyond uncertainty or even disdain. A particularly unhappy outcome would result if Japan were relentlessly to pursue global market share without transferring technology abroad, improving the quality of life of its citizens, or creating more opportunities at home for foreign participation in Japan's market and research systems while the United States fails to make the needed investments in education and improvements in productivity. To cope with Japan as a technological superpower, the United States must itself maintain leadership.

There is a psychological dimension to the problem. Americans, unaccustomed to being behind, may be tempted to place the blame on others. Japanese, new to the role of technology leaders, may be tempted toward arrogance and perhaps overconfidence. Even if these problems can be avoided, there is still the possibility that we will talk past each other, Americans turning inward to a new technonationalism and Japanese to a rhetoric of internationalization without substance.

From a U.S. political perspective, the need to integrate objectives across policy areas is now apparent. It will be necessary to combine scientific, economic, and security goals in pursuit of the national interest. It would be dangerous to lay too much emphasis in one area to the neglect of others, or to overlook the tradeoffs. The

bureaucratic mechanisms for dealing with economic policy issues in the bilateral relationship are myriad, but incapable of integrating objectives. The fact that Japan's policy process is much less well understood in the United States than vice versa heightens the problem. To influence policy, the Japanese hire highly paid, insider consultants while Americans apply *gaiatsu*—pressure from the outside.

Japan's emergence as a technological superpower creates significant uncertainties: the U.S. economic and political situation could worsen if effective policy responses are not forthcoming. Inadequate understanding of the changing nature of the U.S.-Japan relationship, combined with lack of consensus on how best to proceed, suggest the prospect of serious difficulties ahead.

PRIORITY CONCERNS

We will have to both compete and collaborate with Japan in a context of increasing technological parity. This means the United States must develop a clearer strategy for U.S.-Japan linkages in science and technology: mutually beneficial collaboration in science and technology should be the goal, but special efforts must be made to expand technology transfers to the United States and to develop criteria for judging the potential benefits and risks of specific types of collaboration.

A top priority for the United States should be to expand the flow of technology from Japan to the United States. There are a variety of mechanisms that can be used—licensing of Japanese technology by U.S. firms, technical training of U.S. employees by Japanese firms in the United States, joint research in Japan's best laboratories. In the years ahead, cooperative projects that involve transfers of Japanese-origin, dual-use technology to defense-related projects will take on more importance. Japan has done a much better job of tapping into U.S. scientific and technological expertise than vice versa. The U.S. government and the private sector must work together to put in place incentives to reward technical personnel who study Japanese and organizations that invest the resources needed to monitor and access Japanese technology. Special consideration should be given

to encouraging such U.S. organizations to diffuse their knowledge about that process to others.

A corollary priority should be to use the technologies transferred from Japan to produce beneficial effects on the U.S. economy. What this means in concrete terms is that we should be able to identify the beneficial effects on the U.S. economy of technology sharing with Japan. Focusing on the results (especially the economic impacts) of the policies and the technological linkages rapidly growing between our two countries should force us to take a long-term, pragmatic view. The challenge is for U.S. organizations to use effectively the technological expertise we get from Japan in improved production and marketing of goods and services.

Cooperation in scientific research should be continued and cooperative approaches to construction of scientific facilities should be pursued. Individual U.S. and Japanese scientists have successfully collaborated in many areas during the past forty years. The question is how to promote long-term interactions between U.S. and Japanese universities and other organizations involved in basic research. It may be necessary to consider new types of grants and support that provide multiyear funding of major, ongoing collaborative projects, particularly those that contribute to the resolution of global problems.

In order to stimulate an informed debate about when to compete and when to cooperate with Japan, we need to improve our understanding of how technological linkages affect national as well as corporate interests. We need a better understanding of the extent and nature of the technological linkages between the private sectors in the United States and Japan and an evaluation of their impacts on bilateral trade, security, and diplomatic relations. The purpose should be to build a sounder basis for judgments about the scope and direction of technology transfers by examining experience to date.

Looking ahead to the next century and an era when the United States and Japan will both be technological superpowers, considerable effort will be needed to structure (and restructure) joint ventures, collaborative research, and other forms of science and technology exchange. In many cases, collaboration will not be feasible because of intense market competition or because there is no political consensus that the necessary effort is justified. There is a need to review and

assess past experiences—examples of successful technology transfer from Japan to the United States, as well as joint projects that fail. Today we lack the necessary informational and analytical base to do this. In the meantime, however, policymakers must make decisions on proposals to expand government regulation in areas such as foreign direct investment, which is a mechanism for technology transfer in both directions.

The analysis and evaluation should be designed to identify the mechanisms (organizations and approaches) that work best to ensure that the U.S. partner receives and uses technology transferred from Japan. Technologists and businessmen in particular must have a thorough understanding of how Japan's research and market systems operate in order to negotiate strategic alliances that work. We should not neglect the importance of diffusing this knowledge of technology transfer mechanisms—making it available to more people and organizations. Some large American companies have invested the time and resources needed to access Japanese technology and markets, but these are the exceptions. Cooperative approaches (involving companies, universities, and other organizations) may be needed to improve access to Japanese technology and to promote long-term R&D collaboration with Japanese organizations.

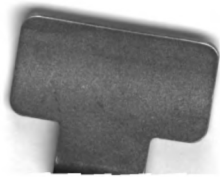
A prerequisite for a results-oriented approach to U.S.-Japan technological linkages is for the United States to maintain and expand leadership in at least enough fields of science and technology to ensure that both countries will continue to be "players"—sometimes rivals, sometimes partners, but both on the front line. Japan will also face significant challenges in building a stronger scientific research base. Because of the structural differences in the organization of the U.S. and Japanese markets and research systems, R&D collaboration will have to be carefully structured to ensure that both sides really benefit, that results are tangible, and that the benefits are clear in economic terms.

The basic rationale for managing U.S.-Japan relations in this new context of technological parity is that the United States and Japan must both continue to be frontline players. This means that exclusive reliance on indigenous science and technology is not only misguided—it is impossible. It also means that both have an interest in seeing that

competition is not carried to such an extreme that the leadership role of either of the two countries is seriously endangered.

In the future, we will need to work harder to structure collaboration in the midst of market competition and concerns about national security. Realistic assessment of self-interest, bargaining, and willingness to reevaluate and renegotiate are prerequisites for policy adaptation. But they are not sufficient conditions. Vision and leadership will be required to maintain a context in which both the United States and Japan survive and prosper.

These are urgent issues which demand attention by the nation's leadership. *The private sector—business and academic leaders—must take the initiative in improving understanding of the benefits and risks associated with private sector technological linkages between the United States and Japan.* Policymakers need to hear from those with firsthand experience in technology exchange with Japan, as well as from other affected parties. Policy choices must be based on the analysis and evaluation that results from a systematic review of past experience. In order to maximize the potential gains of private sector linkages with Japan, however, creative thinking about new approaches will also be needed. The danger is that frictions and resentments will grow before we develop a strategy for competing and cooperating with Japan.



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